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(54) **SELF-MOVING DUST SUCTION DEVICE**

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A47L 9/00 (2006.01)

(52) **U.S. Cl.**
CPC ***A47L 11/4041*** (2013.01); ***A47L 9/009*** (2013.01); ***A47L 11/4058*** (2013.01); *A47L 11/4052* (2013.01); *A47L 2201/00* (2013.01); *A47L 2201/02* (2013.01)

(58) **Field of Classification Search**
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USPC 15/319
IPC A47L 9/28
See application file for complete search history.

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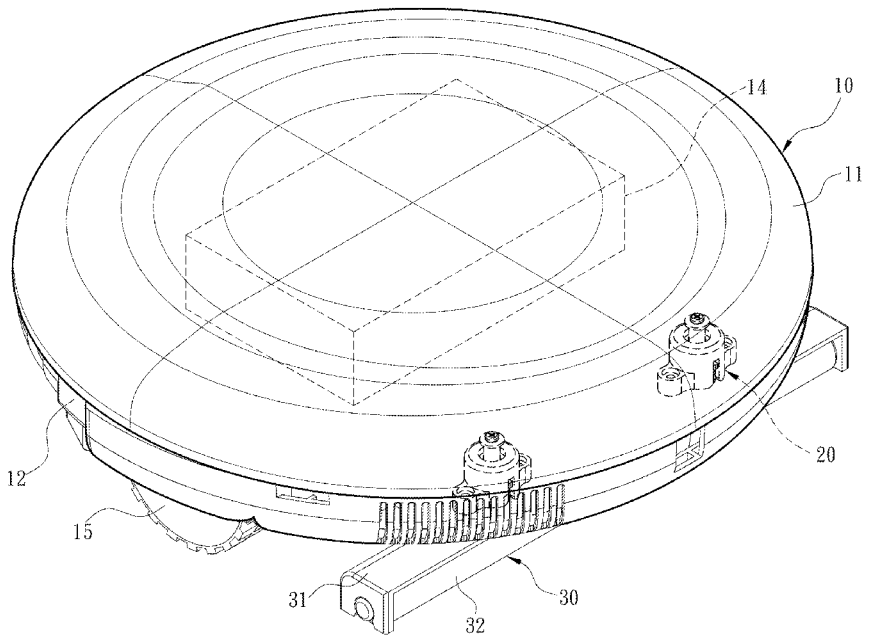
(57) **ABSTRACT**

A self-moving dust suction device comprises a body, at least one buffer means and a sticking means. The body includes a top cover, a base, a dust suction operation module, at least two movement wheels and at least one mounting portion. The buffer means is corresponding to the mounting portion and has an installation dock fastened to the mounting portion, a buffer element located on the installation dock to provide an action force in a direction remote from the top cover in normal conditions and a butting dock located at one end of the buffer element remote from the top cover to bear the action force. The sticking means is located at one side of the base and has a connection bracket coupled with the butting dock to receive the action force transmitted by the butting dock and a sticking roller located on the connection bracket.

12 Claims, 5 Drawing Sheets



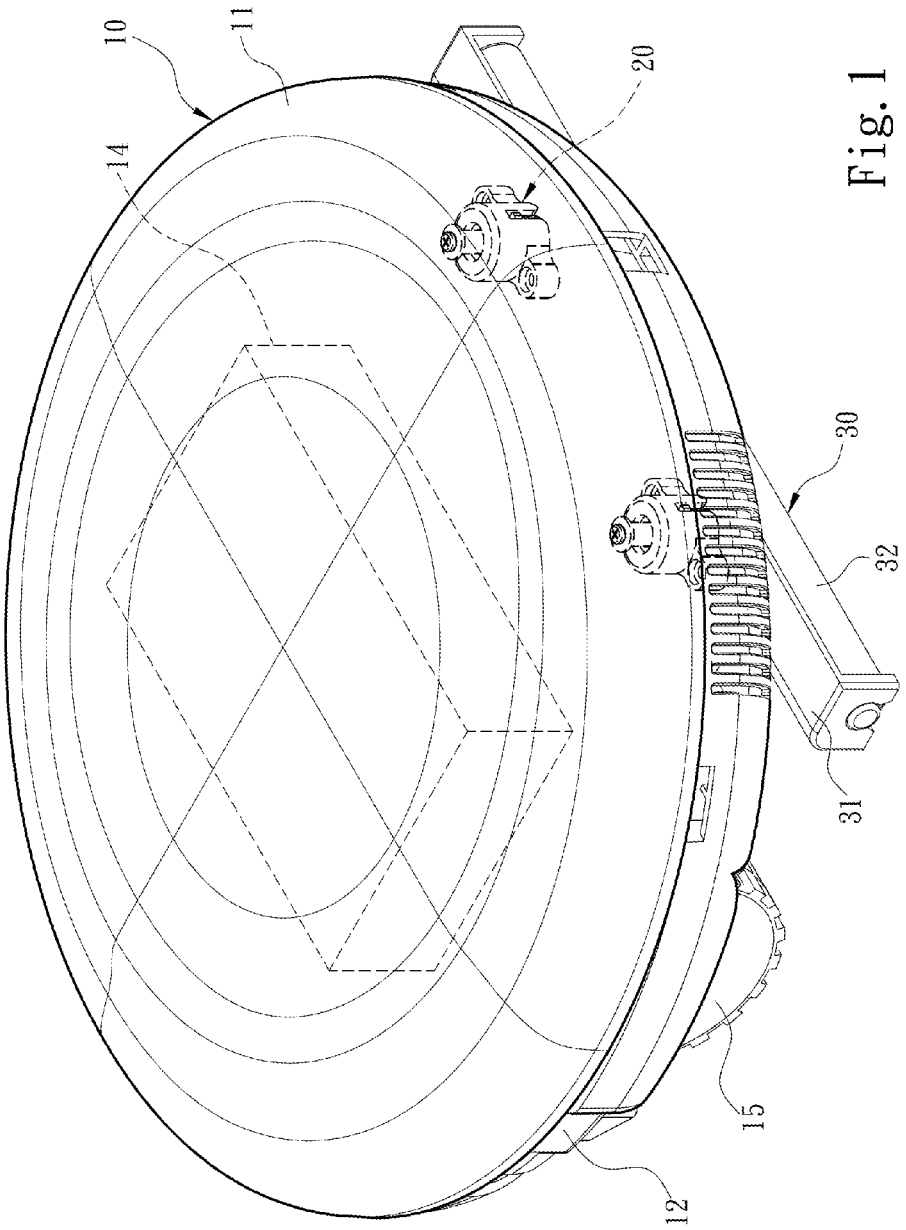


Fig. 1

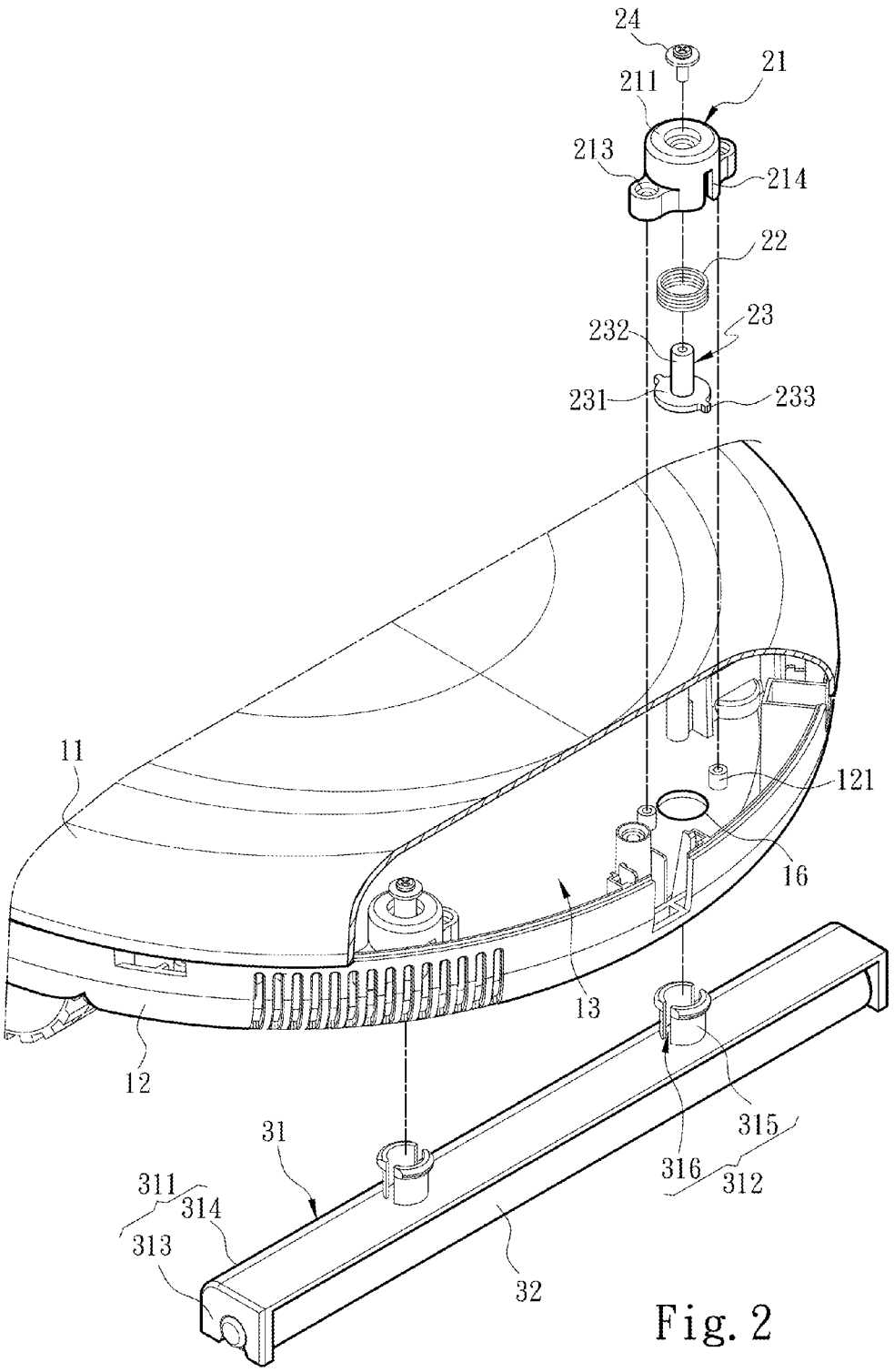

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Fig. 2

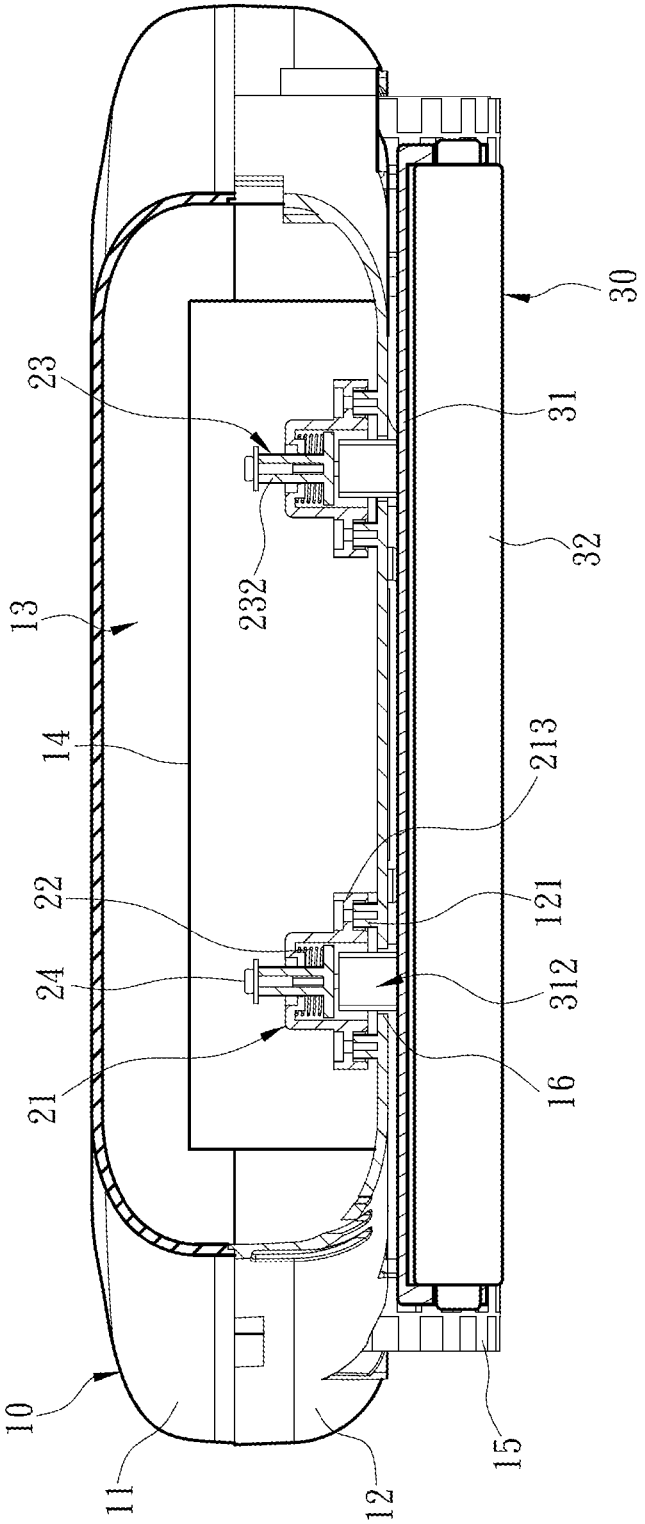

Fig. 3

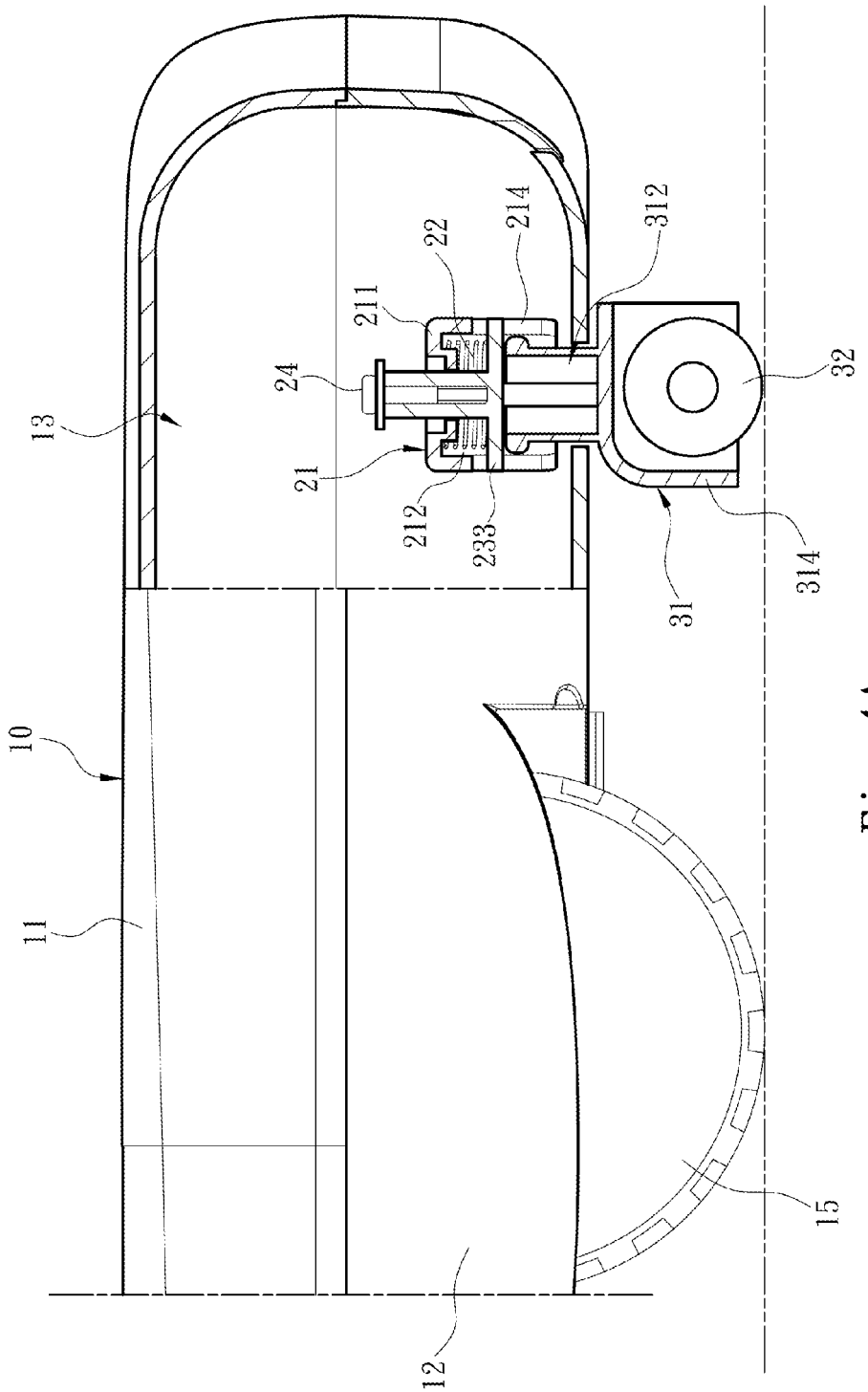

Fig. 4A

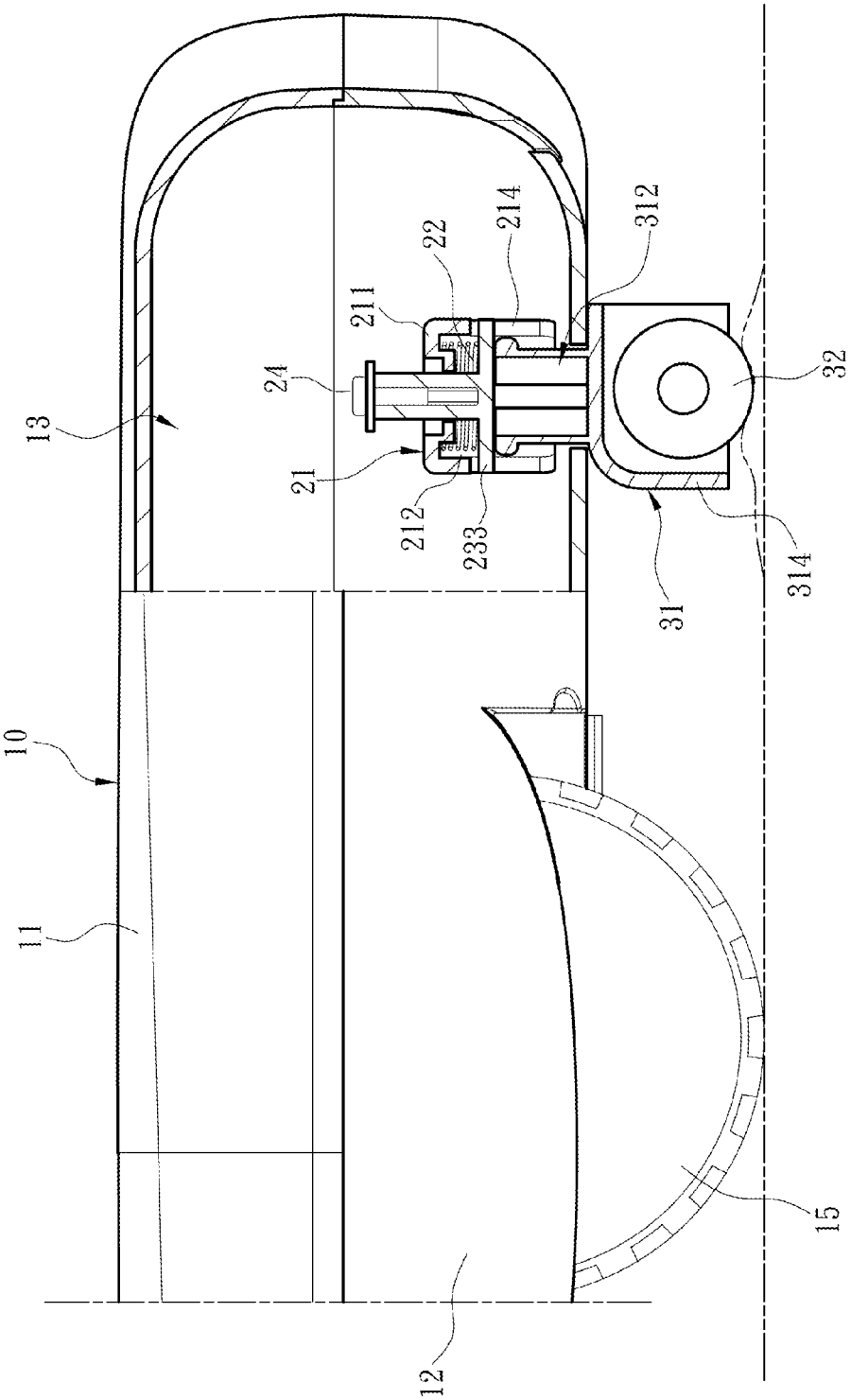

Fig. 4B

SELF-MOVING DUST SUCTION DEVICE

FIELD OF THE INVENTION

The present invention relates to a self-moving dust suction device and particularly to a self-moving dust suction device that also performs dust sticking while executing dust suction operation.

BACKGROUND OF THE INVENTION

With advance of technology nowadays many types of cleaning devices also are built with automation and intelligence capability. Most families also prefer to purchase multi-functional cleaning devices. Dust suction device is the most commonly seen household cleaning device. However, the conventional dust suction device generally is bulky in size and difficult for storing. Moreover, it usually generates very high decibel noises during dust suction operation. To resolve these problems automatic dust suction devices (such as iROBOT) have been developed and marketed. iROBOT is compact in size and can function without human control, hence can overcome the aforesaid problems. But while the conventional iROBOT can suck the dust, due to its design limitation it has difficulty to suck fine hairs or other small particles. To address this concern, a remote control dust suction device has been proposed that includes a flat disk, a roller means and a remote control means. The roller means has a sticking roller at the bottom of the flat disk. When a drive means of the remote control dust suction device is activated and the remote control dust suction device moves to do dust suction operation the sticking roller touches the floor surface at the same time to stick hairs on the floor. However, when the remote dust suction device moves on uneven floor surface the sticking roller cannot adjust to suit the uneven floor surface, hence operation of the remote control dust device is affected or cleaning task is incompletely executed.

SUMMARY OF THE INVENTION

The primary object of the present invention is to solve the problem of the conventional self-moving dust suction devices equipped with a sticking roller which is not adjustable with the uneven floor surface.

To achieve the foregoing object the present invention provides a self-moving dust suction device that comprises a body, at least one buffer means and a sticking means. The body includes a top cover, a base coupled with the top cover to jointly define a housing space, a dust suction operation module located on the base and held in the housing space, at least two movement wheels located on the base and driven by the dust suction operation module and at least one mounting portion located at one side of the base remote from the top cover. Each buffer means is corresponding to the mounting portion and has an installation dock fastened to the mounting portion, a buffer element located on the installation dock to provide an action force in a direction remote from the top cover in normal conditions and a butting dock located at one end of the buffer element remote from the top cover to bear the action force. The sticking means is located at one side of the body corresponding to the base and has a connection bracket to receive the action force transmitted by the butting dock and a sticking roller located on the connection bracket.

In one embodiment the base has a first assembly portion close to the mounting portion to fasten the installation dock.

In another embodiment the installation dock includes a seat, an assembly space formed on the seat for assembly of the buffer element and a second assembly portion located on an edge of the seat corresponding to the first assembly portion.

In yet another embodiment the butting dock includes a baseboard corresponding to the installation dock and in contact with the buffer element to receive the action force in the normal conditions, and an assembly strut located on the baseboard and extended toward the installation dock to couple with the buffer element and fasten to the installation dock.

In yet another embodiment the installation dock has a track located on the seat and communicating with the assembly space, and the buffer dock has a rib corresponding to the track to confine movement amplitude of the butting dock.

In yet another embodiment the connection bracket has a rack for assembly of the sticking roller and at least one installation portion located on the rack and facing the base to couple with the installation dock.

In yet another embodiment the rack includes a connection portion for installation of the sticking roller and a dust barrier extended from the connection portion to partially cover the sticking roller. The installation portion includes at least two spaced assembly walls to jointly define a buffer gap. The assembly space has an inner diameter. The installation portion has an outer diameter greater than the inner diameter.

In yet another embodiment the body is a circular disk.

In yet another embodiment the buffer means has a fastener fastened to the installation dock, moreover, the fastener is a screw.

The invention, by means of the structure set forth above, compared with the conventional structures, provides many advantageous features, notably:

Through a buffer means an action force is provided in normal conditions to the sticking means so that the sticking means is in contact with the floor surface in the normal conditions. In the event that the floor surface is uneven the buffer element in the buffer means allows the sticking means to squeeze the buffer element in a suitable manner so that the sticking means can also respond the uneven condition of the floor surface, thereby the sticking means can make suitable adjustment according to the uneven floor surface to avoid the problem of incomplete dust suction that might otherwise occur.

The foregoing, as well as additional objects, features and advantages of the invention will be more readily apparent from the following detailed description, which proceeds with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of an embodiment of the invention.

FIG. **2** is an exploded view of an embodiment of the invention.

FIG. **3** is a fragmentary sectional view of an embodiment of the invention.

FIG. **4**A is a schematic view of an embodiment of the invention showing an operation condition.

FIG. **4**B is a schematic view of an embodiment of the invention showing another operation condition.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Please referring to FIGS. **1** and **2**, the present invention aims to provide a self-moving dust suction device that

comprises a body **10**, at least one buffer means **20** corresponding to the body **10** and a sticking means **30** located on the body **10**. The body **10** can be made and adjusted according to implementation requirements, such as, but not limited to, a circular disk. The body **10** includes a top cover **11**, a base **12** coupled with the top cover **11** to jointly define a housing space **13**, a dust suction operation module **14** located on the base **12** and held in the housing space **13**, at least two movement wheels **15** located on the base **12** and driven by the dust suction operation module **14** and at least one mounting portion **16** located at one side of the base **12** remote from the top cover **11**. Furthermore, the top cover **11** is made in a shape and size mating the base **12** for coupling therewith to jointly form the housing space **13**. In addition, the dust suction operation module **14** can be driven and moved to do dust suction operation. In one embodiment the dust suction operation module **14** includes a dust suction portion, a power drive portion, a power storage portion and a dust collection portion. The power drive portion gets operation power from the power storage portion that is needed to perform dust suction operation and move. After the power drive portion is activated, aside from making the dust suction portion to perform dust suction operation, it also drives the movement wheels **15** to rotate. Dust gathered by the dust suction portion during the dust suction operation is temporarily held in the dust collection portion. In addition, in one embodiment of the invention, each mounting portion **16** can be a recess located at one side of the base **12** remote from the top cover **11** or an aperture run through the base **12**. In the embodiment, in order to facilitate discussion, the mounting portion **16** is assumed running through the base **12**, as shown in FIG. **2**.

Please referring to FIGS. **1** and **2** again, the buffer means **20** is made corresponding to each mounting portion **16**, namely, each buffer means **20** is installed on one corresponding mounting portion **16**. Each buffer means **20** also is connected to the sticking means **30**, and includes an installation dock **21** fastened to the mounting portion **16**, a buffer element **22** located on the installation dock **21** to provide an action force in a direction remote from the top cover **11** in normal conditions, and a butting dock **23** located at one end of the buffer element **22** remote from the top cover **11** to bear the action force in the normal conditions. In one embodiment the buffer means **20** is assembled in an order such as, from the top cover **11** toward the base **12**, the installation dock **21**, the buffer element **22** and the butting dock **23**. The installation dock **21** is fastened to one end of the base **12** to make the buffer element **22** to provide the action force in the direction remote from the top cover **11**. The butting dock **23** received the action force transmits the action force to the sticking means **30** so that during the self-moving dust suction device is performing dust suction operation the sticking means **30** touches floor surface in the normal conditions. The buffer element **22** can be an elastic element such as a spring, an elastic pad or the like.

Also referring to FIGS. **1** and **2**, the sticking means **30** is located at one side of the body **10** corresponding to the base **12**, and includes a connection bracket **31** connected to the butting dock **23** to receive the action force transmitted thereof and a sticking roller **32** located on the connection bracket **31**. Furthermore, while the self-moving dust suction device is in use to perform dust suction operation the sticking roller **32** rolls with movement of the body **10** to stick hairs or fine dust on the floor surface. Moreover, the connection bracket **31** receives the action force transmitted from the butting dock **23** in the normal conditions so that the sticking roller **32** is pushed to touch the floor surface.

Please referring to FIGS. **2** and **3**, in one embodiment of the invention the base **12** further includes a first assembly portion **121** close to the mounting portion **16** for fastening the installation dock **21**. Moreover, the installation dock **21** has a seat **211**, an assembly space **212** formed on the seat **211** for installation of the buffer element **22** and a second assembly portion **213** at one edge of the seat **211** to mate the first assembly portion **121** for installation thereof. Furthermore, for installation of the buffer means **20** on the mounting portion **16**, first, assemble the second assembly portion **213** of the installation dock **21** with the first assembly portion **121** so that the installation dock **21** is corresponding to the mounting portion **16** and fastened to the base **12**. More specifically, the first assembly portion **121** and the second assembly portion **213** can be a snap coupling structure, a bolt structure or other fastening structure.

Please referring to FIGS. **2** and **3**, the butting dock **23** includes a baseboard **231** corresponding to the installation dock **21** in contact with the buffer element **22** to receive the action force in the normal conditions and an assembly strut **232** located on the baseboard **231** and extended toward the installation dock **21** to couple with the buffer element **22** and confine the butting dock **23** on the installation dock **21** to be movable up and down thereon. More specifically, the assembly strut **232** runs through the seat **211** to form confining relationship therewith, and when the self-moving dust suction device is moving on an uneven floor surface the butting dock **23** receives action from the sticking means **30** and moves vertically and reciprocally against the seat **211**. In addition, the assembly strut **232** can be positioned at the substantial center of the baseboard **231** so that the action force provided by the buffer element **22** can be evenly distributed to the baseboard **231**. Moreover, the buffer means **20** has a fastener **24** fastened to the assembly strut **232** to confine the assembly strut **232** to the installation dock **21**, and the assembly strut **232** can be moved properly against the installation dock **21**. In one embodiment the fastener **24** can be, but not limited to, a screw, a tenon or other fastenable structure.

The installation dock **21** can further include a track **214** on the seat **211** connected to the assembly space **212**. The butting dock **23** has a rib **233** corresponding to the track **214** to confine movement amplitude of the butting dock **23**. More specifically, the track **214** can be formed on a side wall of the seat **211** and extended toward the top cover **11**; in other words, the track **214** has a release end at one side facing the base **12**, and a closed end at another side facing the top cover **11**. The rib **233** of the butting dock **23** can be installed in the track **214** through the release end and is movable as desired against the track **214**.

Please referring to FIGS. **2** and **4**A, the connection bracket **31** of the sticking means **30** has a rack **311** for installation of the sticking roller **32** and at least one installation portion **312** located on the rack **311** and faced the base **12** to couple with the installation dock **21**. The rack **311** includes a connection portion **313** for installation of the sticking roller **32** and a dust barrier **314** extended from the connection portion **313** to partially cover the sticking roller **32**. More specifically, the dust barrier **314** can block the dust raised during movement of the self-moving dust suction device.

In addition, the installation portion **312** includes at least two spaced assembly walls **315** that jointly define a buffer gap **316**. Moreover, the assembly space **212** has an inner diameter, while the installation portion **312** has an outer diameter greater than the inner diameter. More specifically, at the initial stage of coupling the installation portion **312** on

the installation dock **21**, with the outer diameter of the installation portion **312** greater than the inner diameter of the assembly space **212**, the installation portion **312** is squeezed during the assembly process and each assembly wall **315** also is compressed toward the buffer gap **316**, finally the installation portion **312** is installed in the assembly space **212** with each assembly wall **315** returned to the original condition without receiving the force, thus can butt the inner wall of the assembly space **212** so that the installation portion **312** can latch in the assembly space **212**.

Please refer to FIGS. **3**, **4**A and **4**B for actual implementation of the self-moving dust suction device of the invention.

Initially, the self-moving dust suction device is placed on a floor surface, the buffer means **20** provides the action force to make the sticking means **30** in contact with the floor surface in normal conditions as shown in FIG. **4**A. When the self-moving dust suction device is activated to perform dust suction operation, it moves on the floor surface. In the event that the floor surface is uneven, the sticking roller **32** of the sticking means **30** moves toward the base **12** of the body **10** due to the uneven floor surface; meanwhile, the installation portion **312** pushes the butting dock **23** to move in the same direction to compress the buffer element **22**, therefore the sticking means can adjust properly with the uneven floor surface and generate buffer function as shown in FIG. **4**B. After the self-moving dust suction device has moved away from the uneven floor surface the buffer element **22** loses the compressed action force and returns to the state in the normal conditions, and provides the action force again, and the butting dock **23** receives the action force and transmits the action force to the connection bracket **31** of the sticking means **30**; the connection bracket **31**, through the action force and its own gravity, makes the sticking means **30** to touch the floor surface again.

As a conclusion, the self-moving dust suction device of the invention includes a body, at least one buffer means and a sticking means. The body includes a top cover, a base coupled with the top cover to jointly form a housing space, a dust suction operation module located on the base and held in the housing space, at least two movement wheels located on the base and driven by the dust suction operation module, and at least one mounting portion at one side of the base remote from the top cover. Each buffer means is corresponding to the mounting portion, and includes an installation dock fastened to the mounting portion, a buffer element located on the installation dock to provide an action force in a direction remote from the top cover in normal conditions, and a butting dock located at one end of the buffer element remote from the top cover to bear the action force. The sticking means is located at one side of the body corresponding to the base and includes a connection bracket connected to the butting dock to receive the action force transmitted by the butting dock, and a sticking roller located on the connection bracket. The buffer element on the installation dock provides the action force in the direction remote from the top cover in the normal conditions, and the action force butts the butting portion and is transmitted via the installation dock to the connection bracket so that the sticking roller can be moved in the direction remote from the top cover in the normal conditions to stick hairs, thereby solve the problem of the conventional self-moving dust suction device moving on uneven floor surface by enabling the sticking roller to make proper adjustment while moving on the uneven floor surface so that the sticking roller can touch the floor surface in the normal conditions to avoid the problem of incomplete sweeping.

What is claimed is:

1. A self-moving dust suction device, comprising:

a body including a top cover, a base coupled with the top cover to jointly form a housing space, a dust suction operation module located on the base and held in the housing space, at least two movement wheels located on the base and driven by the dust suction operation module and at least one mounting portion located at one side of the base remote from the top cover;

at least one buffer means which corresponds to the mounting portion and includes an installation dock fastened to the mounting portion, a buffer element located on the installation dock to provide an action force in normal conditions in a direction remote from the top cover, and a butting dock located at one end of the buffer element remote from the top cover to bear the action force in the normal conditions; and

a sticking means which is located at one side of the body corresponding to the base and includes a connection bracket coupled on the butting dock to receive the action force transmitted by the butting dock and a sticking roller located on the connection bracket.

2. The self-moving dust suction device of claim **1**, wherein the base comprises a first assembly portion abutting the mounting portion for fastening of the installation dock.

3. The self-moving dust suction device of claim **1**, wherein the installation dock includes a seat, an assembly space formed on the seat for assembly of the buffer element and a second assembly portion at one edge of the seat corresponding to the first assembly portion for installation thereof.

4. The self-moving dust suction device of claim **3**, wherein the butting dock includes a baseboard corresponding to the installation dock in contact with the buffer element to receive the action force in the normal conditions and an assembly strut located on the baseboard and extended toward the installation dock to couple with the buffer element and confine the butting dock on the installation dock to be movable up and down thereof.

5. The self-moving dust suction device of claim **3**, wherein the installation dock includes a track located on the seat and communicating with the assembly space, the butting dock including a rib corresponding to the track to confine movement amplitude of the butting dock.

6. The self-moving dust suction device of claim **3**, wherein the connection bracket includes a rack for assembly of the sticking roller and at least one installation portion located on the rack and faced the base to couple with the installation dock.

7. The self-moving dust suction device of claim **6**, wherein the rack includes a connection portion for installation of the sticking roller and a dust barrier extended from the connection portion to partially cover the sticking roller.

8. The self-moving dust suction device of claim **6**, wherein the installation portion includes at least two spaced assembly walls which jointly form a buffer gap.

9. The self-moving dust suction device of claim **7**, wherein the assembly space has an inner diameter, and the installation portion has an outer diameter greater than the inner diameter.

10. The self-moving dust suction device of claim **7**, wherein the body is a circular disk.

11. The self-moving dust suction device of claim **1**, wherein the buffer means comprises a fastener fastened to the installation dock.

12. The self-moving dust suction device of claim 11, wherein the fastener is a screw.

* * * * *